



Manufacturing and Logistics in Indiana

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This State of the Industry Report for Manufacturing and Logistics in Indiana is designed to provide an annual update of data, information and analysis of these important sectors of our economy. In this report, we compile the most recent data on Indiana and where appropriate, the border states of Michigan, Illinois, Kentucky and Ohio. Our goal is to compare data, provide analysis of these data and clarify the major areas of both private and public sector concern over these major sectors of our State's economy.

We organize this report into four main sections: Industry Big-Picture, Detailed Industry Data and Business Climate. In the first section, we outline the size and scope of the industry, and its recent history. In our Detailed Industry Data section, we examine the scope and occupational mix of manufacturing in the state. We detail metrics of productivity and technological change, research and development. We also look at the role both foreign investment and exports play in Hoosier manufacturing. Throughout this work we weave the role of the logistics sector into our description of manufacturing. The final section is devoted to the Business Climate in Indiana. Educational attainment, and changes to the education of the states' workforce provides the first element of analysis. Here we examine wages, prices for health care and workers' compensation insurance, corporate taxes and production costs both for types of capital and energy. We examine rankings on economic development incentive processes, our business tax climate, and expenditures on key public infrastructure. The fourth section is our long-term forecast of employment and wages in manufacturing and logistics. This report aims to provide a snapshot of these industry sectors and an explanation of where we are now and where we are headed in the immediate future.

Manufacturing and logistics industries nationwide and in Indiana are healthy, vibrant and growing.



Industry Big-Picture



The condition of manufacturing and logistics, nationwide and here in Indiana, remains remarkably misunderstood. Despite record production levels, expanded investment and growth in both wages and productivity, the shrinking or static demand for workers results in a mistaken caricature of these industries as dying. Nothing could be further from the truth.

Manufacturing in the United States involves the production of almost all sorts of goods and services. However, there is an increasing trend towards the production of more high value added goods. This is the natural result of the use of more productive inputs – both workers and technology. It also means that US factory and logistics workers will continue to be increasingly well paid for their work. This report describes many of the indicators of industry health for both manufacturing and logistics. Here are our key findings:

- Manufacturing and logistics industries nationwide and in Indiana are healthy, vibrant and growing.
- Manufacturing and logistics wages and total compensation are both growing and provide good jobs to Hoosiers in a wide variety of occupations.
- Hoosier manufacturing firms are outperforming the nation's industrial stock indices.
- Manufacturing and logistics productivity growth in Indiana is strong.
- Due to productivity growth, employment in manufacturing production occupations is static.
- Employment in logistics is growing.
- The share of non-production workers in manufacturing and logistics firms continues to decline.
- Our manufacturing and logistics report card ranks 6th nationwide, making it far and away the best in the Midwest.

Industry Big-Picture

Manufacturing in the United States

2007 was a record year for US manufacturing. Industrial production in inflation adjusted values was higher in 2007 than in any previous year. Nationally, growth in the production of goods continues to be robust. Even in the final quarter of 2007, as the national economy slowed, industrial production rose at an annual rate of 2.8 percent.

Productivity and the continuing trend to hire specialty contractors have led to a smaller, more productive and better paid labor force.

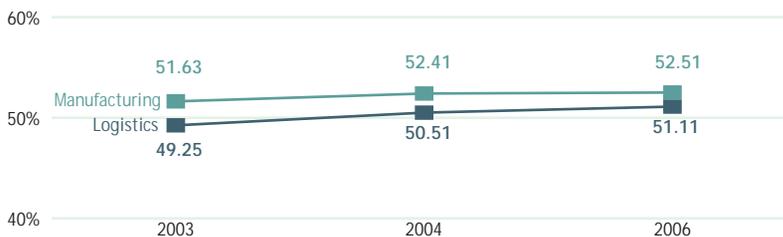
Manufacturing workers have enjoyed wage growth over the past decade. In inflation adjusted dollars, wages

have risen 26 percent over the decade ending in the fourth quarter of 2007. This followed a period of very slow wage growth in manufacturing. Even in the 24 quarters following the recession of 2001, wages for manufacturing workers rose in all but five quarters.

Nationally, manufacturing employment continues to see job losses. Manufacturing employment in the United States peaked in the late 1970s with more than 19.5 million manufacturing workers. That figure has declined to roughly 13.8 million as of early 2008. These job losses are overwhelmingly due to the rapid rate of total factor productivity in manufacturing, and the continuing trend of larger firms to hire specialty contractors for non-core operations. Together, these two factors have led to a smaller, more productive (and better paid) labor force, which is more concentrated on the production aspects within manufacturing firms.

Production/Material Handling Occupation Share

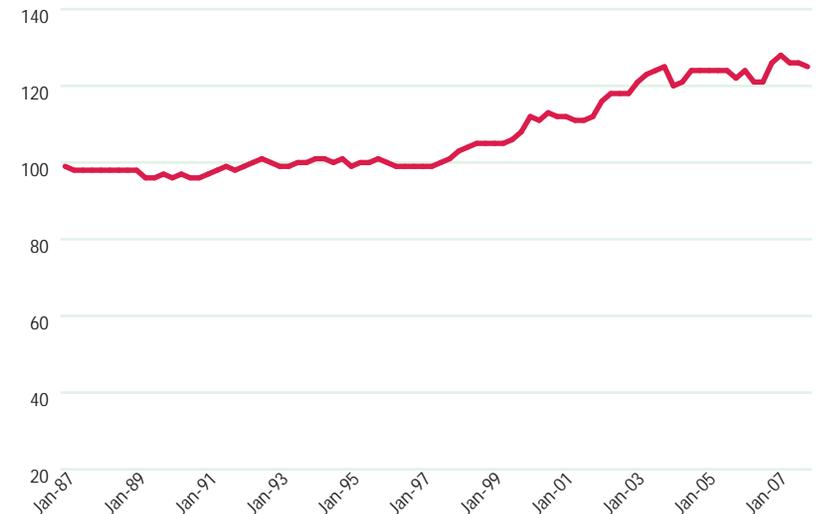
(Source, Occupation and Employment Survey, 2003-2006)



Industrial Production Index (Source, Federal Reserve Bank of St. Louis)

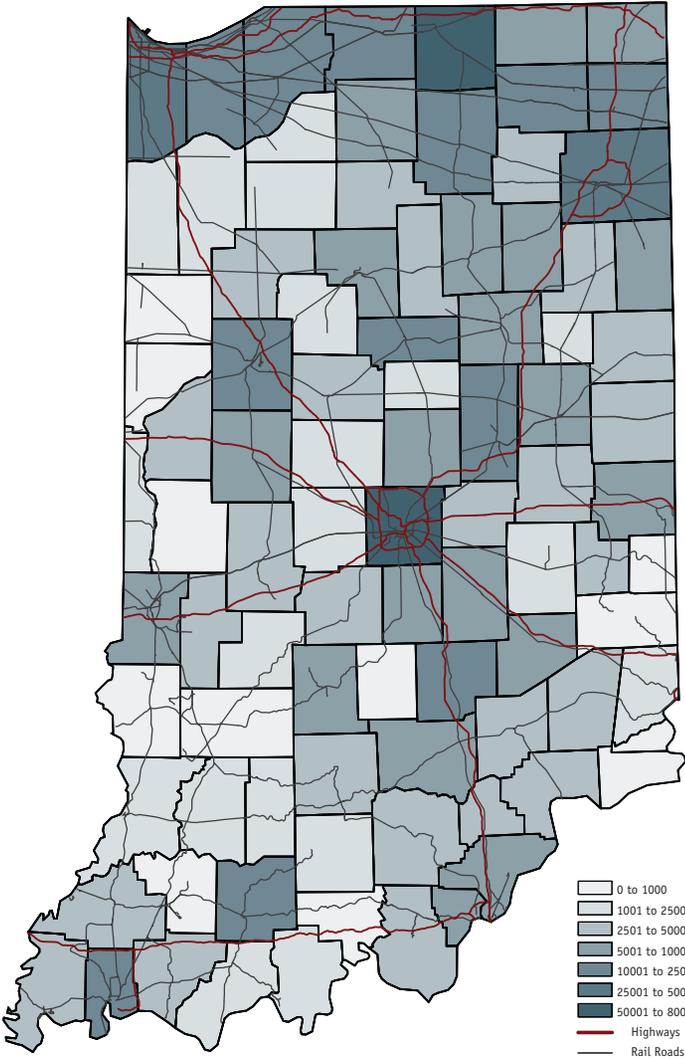


Manufacturing Sector Wage Index (Source, Federal Reserve Bank of St. Louis)



Industry Big-Picture

Manufacturing Density (Source, In-link, Building Better Communities)



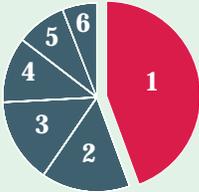
Manufacturing in Indiana

Indiana is the most manufacturing intensive state in the union, with about one-third of goods and services produced in the state coming from the manufacturing sector. We measure the manufacturing share as the proportion of total income earned in Indiana by manufacturing workers. See the figure.

Manufacturing firms are distributed throughout the state, with heavy dependency on Indiana’s robust highway, rail and water transportation system. However, as is apparent in this map, the state enjoys extensive rail and road networks, and access to the inland waterway system on both the Ohio River and Lake Michigan. This means that manufacturing firms hire workers and produce goods in every county of the State.

Manufacturing employment in Indiana has been more stable than in the nation as a whole. This is due to the relatively high productivity of Indiana manufacturing workers, the excellent logistics sector and the attractive business climate of the State. Later sections of the report explain and illustrate these features of Indiana’s economy, which have made it a central location for manufacturing in the United States.

Indiana’s Major Industrial Shares



- 1. Manufacturing
- 2. Government
- 3. Services
- 4. Health Care
- 5. FIRE
- 6. Professional

(Source: Regional Economic Information Systems, Bureau of Economic Analysis)

High productivity, excellent logistics and attractive business climate make Indiana a central location for manufacturing in United States.

Industry Big-Picture

Despite modest job losses in manufacturing, the total wage bill has risen since the last recession (in the last quarter of 2001).

The transportation of these goods is also an important part of the Indiana economy. Employment growth in the transportation sector has been strong over the past decade.

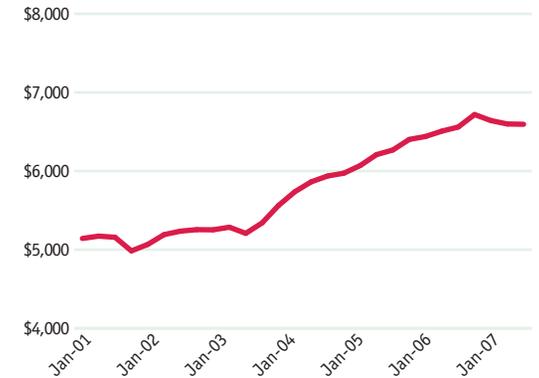
Manufacturing and logistics firms continue to hire workers to replace attrition, in what many industry watchers feel is a very aged labor force. These new jobs pay well in Indiana, and salary growth through tenure is apparent.

As indicated below, Indiana manufacturing firms are also performing well financially. Indeed, when we compare the top 25 Indiana manufacturing firms against the broad Dow Jones Industrial Average, we find remarkable strength in value growth for Indiana's manufacturers.

Wages Paid for Durable and Non-Durable Goods Manufacturing in Indiana (\$1,000,000)
 (Source: Regional Economic Information Systems, Bureau of Economic Analysis)

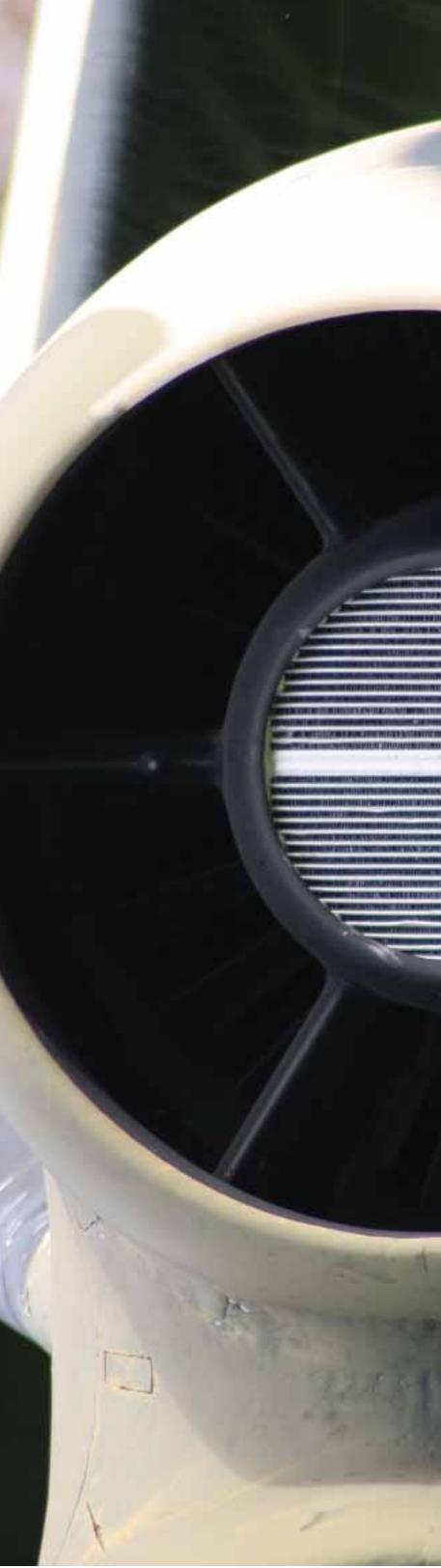


Logistics Wages Paid in Indiana (\$1,000,000)
 (Source: Regional Economic Information Systems, Bureau of Economic Analysis)

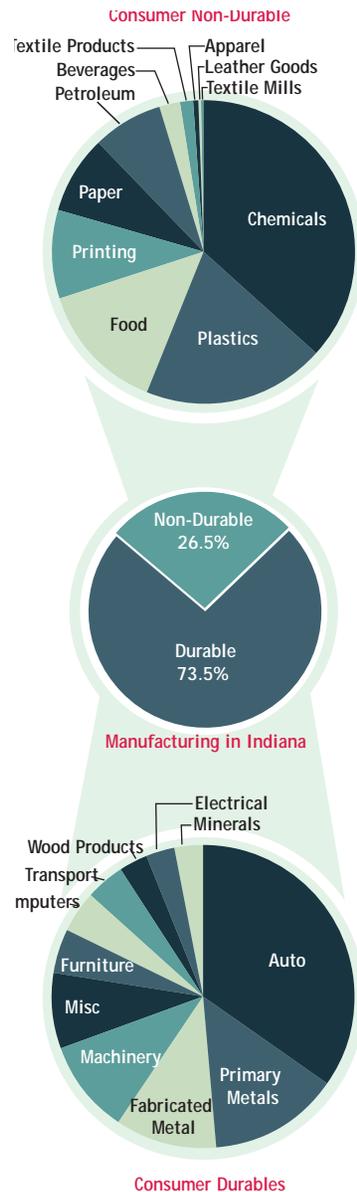


Indiana's Manufacturing Stock Index





Detailed Industry Data



Composition of the Industry

Manufactured goods are usually described as being either consumer durable or non-durables. In Indiana, 73.5 percent of manufactured goods are consumer durables. Consumer durables are those goods not destroyed by their use. By far, Indiana's automobile manufacturers are the largest sector of consumer durables in the State. It is also a growing industry, and Indiana has been ranked by *Business Facilities Magazine*, a leading location and trade journal, as the number one state in automobile manufacturing growth in 2007.

Consumer non-durables are those manufactured goods which are consumed in use. They include food and beverages, most plastic and paper products, petroleum and chemicals and printed goods. Just over 25 percent of the goods produced in Indiana fit this description.

Indiana produced almost \$249 billion of goods in 2005 (the most recent year for Federal production data). The value added by production in the state was over \$90 billion. Indiana's manufacturing firms employ more than one in six Hoosiers. The firms are diverse in size, type of production, ownership structure and origin.

Of the top 15 manufacturing firms in Indiana, seven produce automobiles or other transportation related products, while two produce steel and aluminum products. The remainder produce foodstuffs, pharmaceuticals, act as holding companies for a diverse set of manufacturers, or make electrical products and furniture. The manufacturing industry in Indiana is not however, composed of merely a few major firms, but rather, a highly integrated supply chain.

Indiana's manufacturing firms employ more than one in six Hoosiers, and is composed of a highly integrated supply chain.

Detailed Industry Data

Productivity

The future of manufacturing will largely be determined by the productivity of the industry. Productivity is the value of goods produced compared to some measures of inputs (such as number of workers, amount of capital investment or wage costs). The following table provides several measures of productivity, and factors which indicate future trends of productivity. Productivity varies a great deal between industries within the manufacturing sector. While high productivity is encouraging, it may be due to the dominance of relatively high productivity industries in the region. We will provide more details of productivity and labor costs in a later section.

The value added per worker is perhaps the most common measure of productivity. Here, Hoosier manufacturers perform significantly better than the others in the region. The average product of labor measures the value of goods produced per worker. Indiana leads three of the four states in the region. The value of output per dollar wage spent is another measure of productivity. Again, Indiana is tied in second place across the region. The K/L ratio, is the ratio of invested capital (plant and

equipment, buildings, computers and machinery) per worker (in \$1,000,000s). The capital labor ratio represents ongoing in-

Productivity is the value of goods produced compared to some measures of inputs (such as number of workers, amount of capital investment or wage costs).

vestment in a region. Indiana leads the region only slightly, followed by Kentucky. The capital labor ratio represents the willingness of firms to invest capital relative to their labor force in the state. Finally, growth in value added per worker (from 2001-2005) represents total productivity growth relative to the share of labor employed in the state. Productivity growth in Indiana is strong and compares favorably with our neighboring states.

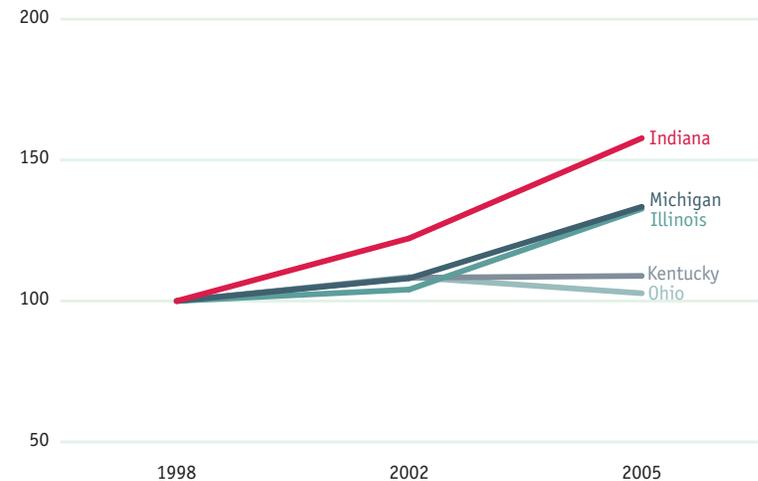
Private Sector Research and Development funding is a sign of a healthy commitment by private firms to technological expansion within a state. This index illustrates the relative growth of private sector R&D over the past decade, and is drawn from the decennial Census of Manufacturers.

Productivity Measures (Source: 2006 Census of Manufacturers)

	Value added per worker (\$1,000 s)	Average product of labor	Output/wage	K/L	Growth in value added per worker
Illinois	148.3	325.8	5.0	0.1	38.6
Indiana	153.9	341.3	5.4	0.2	39.72
Kentucky	143.1	393.5	6.9	0.2	38.33
Michigan	131.7	316.8	4.3	0.1	31.14
Ohio	149.2	332.6	5.4	0.1	39.83
USA	148.3	318.7	5.1	0.1	43.36

Private Sector R&D in Manufacturing Index, 1998-2005

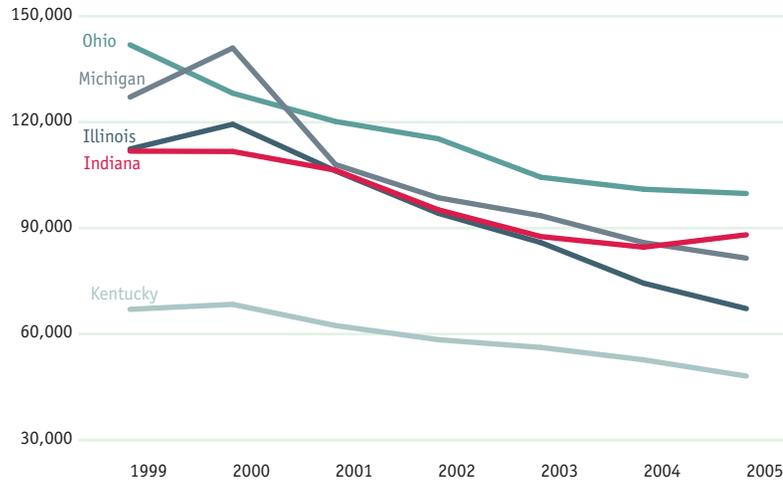
(Source: 2006 Census of Manufacturers)



Detailed Industry Data

Manufacturing Employment from Foreign Direct Investment by State

(Source: Bureau of Economic Analysis, International Economics Accounts)

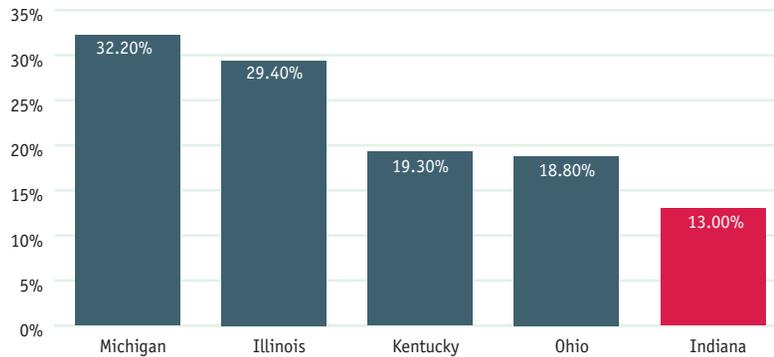


Indiana produces goods and services for domestic and international consumption. Indiana has done well in the international market, in attractive foreign direct investment (FDI), which results in jobs for Hoosiers. Almost 90,000 Indiana manufacturing workers are employed by international firms from outside the United States. This makes Indiana second in the region for total employment due to foreign direct investment. And, in terms of the size of the State's economy, Indiana ranks first in the region in FDI employment. Also, unlike our neighboring states, recent years have seen a reversal in the decline of FDI related employment, beginning in 2005.

The source of FDI related employment is important. As the chart illustrates, Indiana enjoys significant foreign direct investment, ranking second overall and first by size. Also, Indiana is the only state in the region which has attracted FDI related employment from all the major regions of the globe. We estimate that foreign investment in Indiana accounts not only for 90,000 direct manufacturing jobs, but also 54,000 other jobs that are indirectly influenced by the foreign investment in our region. Despite the very close ties with foreign direct investment, Indiana relies more heavily on domestic sales of manufactured goods than our neighbors. The value of our goods sold to non-US consumers is the lowest in the region. This is because we have such an abundance of intermediate suppliers, which creates a dense value-chain within the United States.

Exports Manufacturing Share of Total Value-Added

(Source: Bureau of Economic Analysis, International Economics Accounts)



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The Business Climate

The advantages and disadvantages of Indiana as a location for commercial economic activity matter for the growth of businesses. In particular, relative tax climates (especially business taxes), labor costs (especially healthcare, workers' compensation, unemployment insurance, etc.), and the presence of legislation that either positively or negatively influences business also matter. This section focuses upon geographic variability (rankings and relative differences) and on describing factors that may be altered through public policy.

It is the sum of costs, both private and public, the quality of the regulatory environment, the prospect for available trained labor and access to transportation infrastructure that will lead firms to choose their production geography.

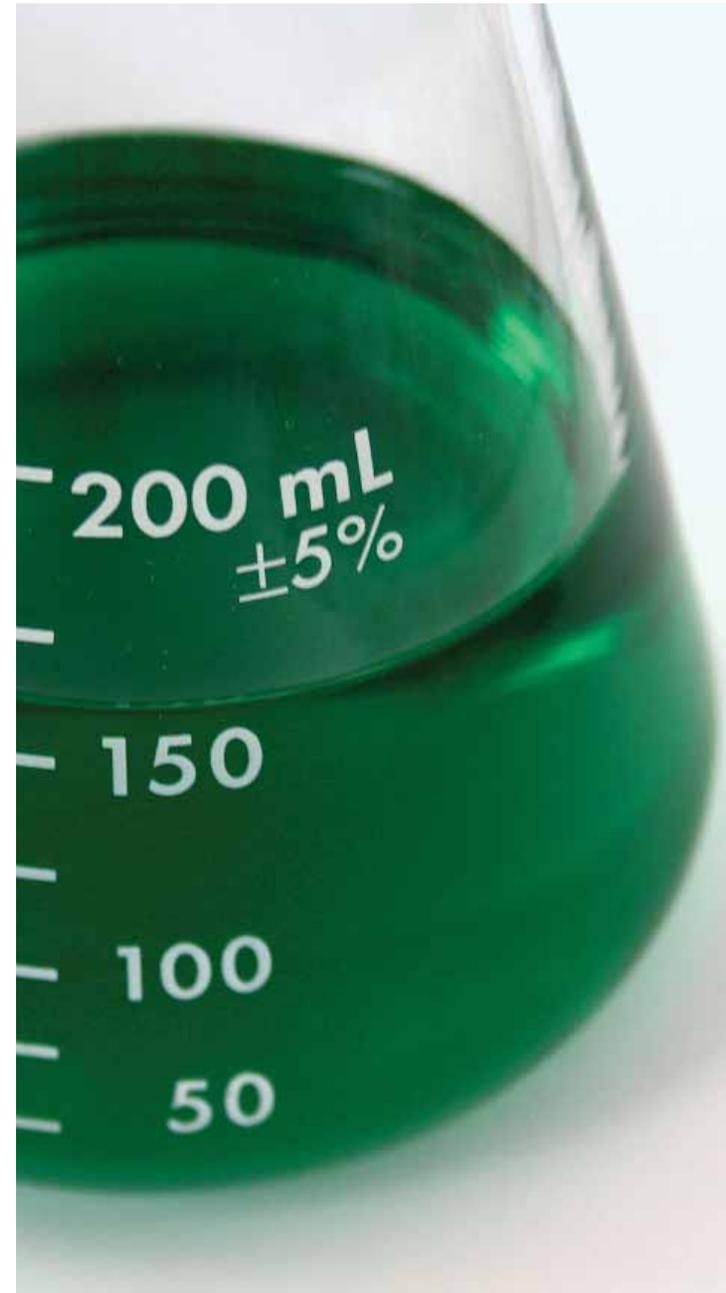
No single factor will alone be responsible for location decisions. Rather, it is the sum of costs, both private and public, the quality of the regulatory environ-

ment, the prospect for available trained labor and access to transportation infrastructure that will lead firms to choose their production geography.

In recent decades, the cost of moving goods has plummeted. Among the consequences of these improvements in transportation are that manufacturing firms can be far more foot-loose in their location decisions.

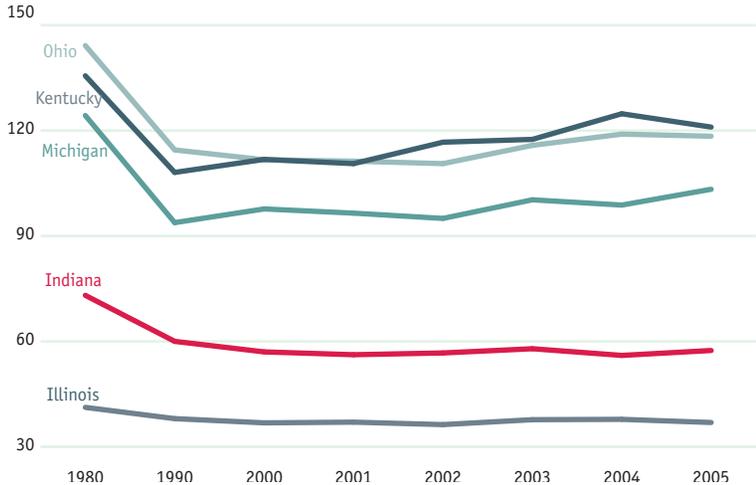
Human Capital

The quality of workers is perhaps the prime geographic determinant of manufacturing expansion. Without a trained and ready workforce, manufacturing firms will be unable to provide the high quality goods, at a cost that is competitive in the global marketplace. As the following data show, Indiana has seen considerable improvement over the past decade both in growth of the college educated population, and the percent with a high school diploma. The result is that Indiana has now caught up to the middle of the regional pack in educational attainment at the high school level. However, we still lag three of the four remaining states in our college graduation rates. Sustained growth in educational attainment at the previous decade's rate will be difficult, but would cause Indiana to emerge near or above the national average as we approach the 2020 census.



The Business Climate

High School Graduates in the Region, 2000-2005
(Source: National Center for Educational Statistics)



The growth of high school graduates throughout the region has been tepid, with only Indiana and Michigan seeing real increases in high school graduates. This raises the specter of labor supply concerns within the region.

Associates degrees, technical training and post secondary education from other sources (often employer based) is increasingly important as a source of skill development. Here Indiana ranked ahead of all but Michigan in the share of adults with Associates Degrees in our region, and well ahead of the national average. As of 2005, which is the most recent data available, Indiana had 8.9 percent of its adults aged 25 to 44 with associates degrees. Michigan had 9.2 percent, while both Ohio and Illinois had 8.6 percent of its adults with associates degrees. The US average was 8.4 percent, and Kentucky experienced 8.2 percent with associate degrees among their 25 to 44 year olds. This reflects the state's commitment to community and technical colleges and the commitment to educate Indiana's workers.

As with the educational attainment of workers, the growth in labor supply plays an important role in determining the location of new plant, or expansion of existing operations. One method of determining the availability of workers is to examine the number of high school graduates by year. As the figure at left reports, the growth of high school graduates throughout the region has been tepid, with only Indiana and Michigan seeing real increases in high school graduates. This raises the specter of labor supply concerns within the region. It also provides emphasis to the importance of educational attainment. It would take a roughly 3.5 percent increase in high school graduation rates in Indiana to produce enough additional workers to populate one large automobile manufacturing facility.

Manufacturing firms carefully examine employment cost issues because their production can occur almost anywhere. Among these are the market wages for manufacturing workers, the rate of fringe benefits per worker and the availability of specialized sub-contract work. In order to better explain the manufacturing and logistics business climate we have created an index of business costs. These include health care prices, workers' compensation and fringe benefit costs, insurance costs and tax rates. We ranked each state in the union, then estimated an overall climate from among all these ranking criterion. Indiana performed very well on this index, ranking 6th overall, and leading the midwest region.

Manufacturing Reportcard Rank

Missouri	A
Utah	A
Florida	A
Alabama	A
South Dakota	A
Indiana	A
Georgia	B
South Carolina	B
Wyoming	B
Kansas	B
Tennessee	B
Colorado	B
Montana	B
Illinois	C
Maryland	C
Virginia	C
Oregon	C
Mississippi	C
Minnesota	C
North Carolina	C
Hawaii	C
New Hampshire	C
Arkansas	C
Nevada	C
Washington	C
Arizona	C
Connecticut	C
Texas	C
Iowa	C
New Mexico	C
Delaware	C
Pennsylvania	C
Louisiana	C
Nebraska	C
Massachusetts	C
Wisconsin	C
Idaho	D
California	D
Michigan	D
Oklahoma	D
Alaska	D
Ohio	D
North Dakota	D
New York	F
Kentucky	F
New Jersey	F
Vermont	F
Rhode Island	F
Maine	F
West Virginia	F

Indiana Manufacturing and Logistics Forecast

Long-Term Forecasts

Manufacturing and Logistics Employment and Wages

These forecasts provide projections of employment and wages in Indiana's manufacturing and logistics sectors through 4th Quarter 2010.

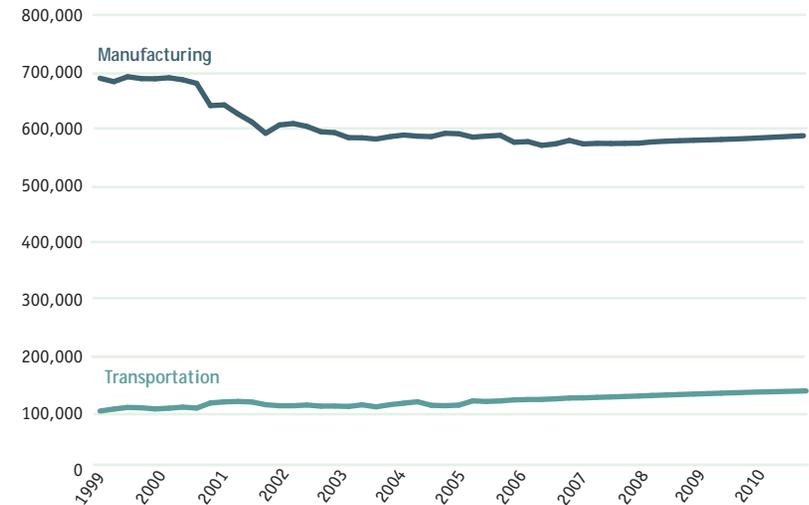
The forecasts were prepared using quarterly workforce data from the Department of Census' Quarterly Workforce Indicators. We based our estimates of future economic activity upon estimates of total economic activity predicted by the FAIR Model of the US economy. This forecasting tool is one of the more reliable national forecasts produced in the United States, and is authored by Dr. Ray Fair at Yale University.

Our model also includes past history of economic activity as a predictor of future performance, as well as a dynamic adjustment feature that captures short-run deviations from trend growth. Importantly, this is a long-term forecast, so it does not attempt to capture short-run dynamics, such as a business cycle, but rather focuses attention on trend growth characteristics. Our model performs well in tests of short-run performance.

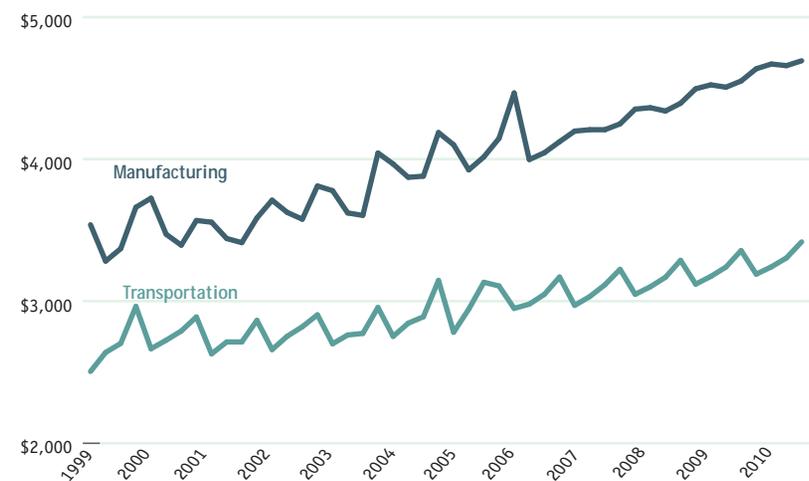
Both industries will continue to experience real wage growth throughout the forecast horizon. We predict that the job losses, which occurred in Indiana manufacturing over the first five years

of this decade, have largely run their course, and that manufacturing employment through the forecast horizon will remain static. This turnaround of the state's employment prospects we believe, is due to the improvements in firm employment balance over this period of employment loss, and due to the relatively friendly business climate enjoyed by Indiana manufacturing firms. Employment in logistics related jobs will continue at the current pace through the forecast horizon. Both industries will continue to experience real wage growth throughout the forecast horizon.

Employment Forecast (Source: Quarterly Workforce Indicators)



Wage Forecast (Source: Quarterly Workforce Indicators)





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About the Bureau:

The Bureau of Business Research is a premier economic policy and forecasting research center housed within the Miller College of Business at Ball State University. The Bureau publishes the *American Journal of Business*—a peer-reviewed scholarly journal—and the *Indiana Business Bulletin*—a Web site with weekly commentary, analysis and data on economic, business and demographic trends in Indiana. Research in the Bureau encompasses health care, public finance, regional economics, transportation and energy sector studies. In addition to research, the Bureau hosts the Executive Economic Exchange in Indianapolis four times a year, and also serves as the forecasting element in the Muncie area—hosting five state and federal economic forecasting roundtables.